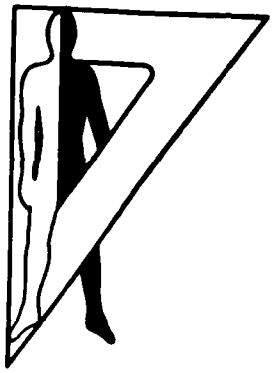

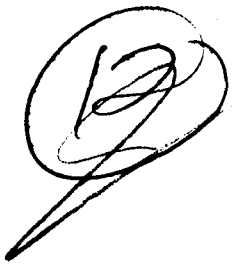

Technical Memorandum 18-79

US ARMY HUMAN ENGINEERING LABORATORY

FEMALE ARTILLERY STUDY

Frank R. Paragallo, Jr.
William J. Dousa, Jr.
Donald L. Lince

October 1979
AMCMS Code 612716.H700011

U. S. ARMY HUMAN ENGINEERING LABORATORY
Aberdeen Proving Ground, Maryland

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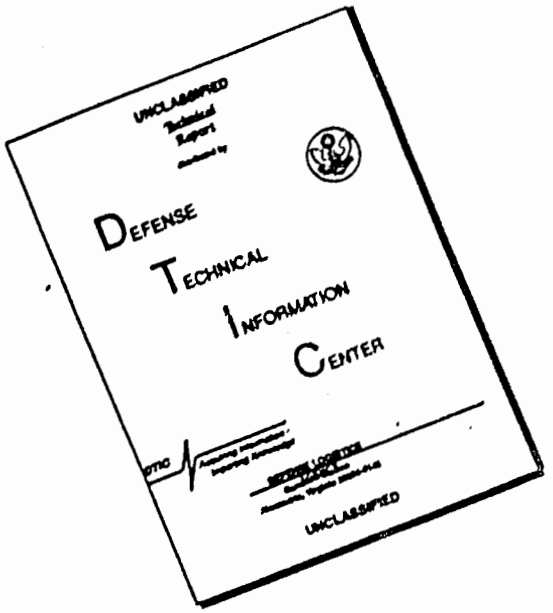

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The US Army Human Engineering Laboratory conducted the female artillery study to evaluate the female soldiers' capability to perform specific tasks associated with loading, laying, and firing selected howitzers. The study showed that female soldiers can successfully attain published rates of fire for the 105mm M101A1 and 155mm M114A1 howitzers.

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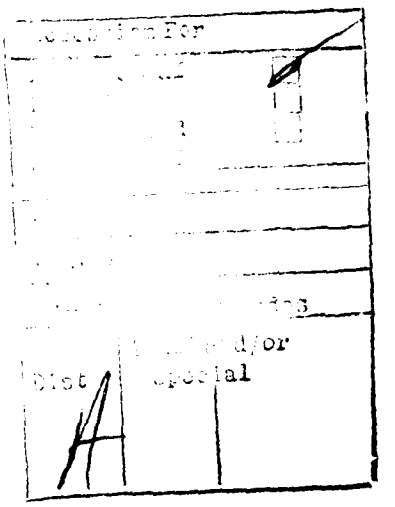

October 1979

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EXECUTIVE SUMMARY

BACKGROUND

The US Army Human Engineering Laboratory conducted a study to determine if female soldiers could meet the currently published rates of fire for the 105mm M101A1 and 155mm M114A1 howitzers.

OBJECTIVES

The objectives were:

1. To evaluate the female soldier's capability to perform specific tasks associated with loading, laying, and firing 105mm and 155mm howitzers.

2. To provide information on the potential of female soldiers to perform artillery related, physically demanding tasks. This evaluation was limited to specifically identified tasks and did not encompass all artillery MOS functions.

PROCEDURE

Data was collected to determine rates of fire attained by female soldiers firing 105mm and 155mm howitzers.

RESULTS

1. Female soldiers successfully met the published rates of fire on the 105mm M101A1 and 155mm M114A1 howitzers.

2. Although this study did not encompass all tasks required of artillery MOS's, the subjects exhibited the ability and aptitude to perform the tasks assigned them.

US ARMY HUMAN ENGINEERING LABORATORY

FEMALE ARTILLERY STUDY

INTRODUCTION

The increasing number of female soldiers has created a need to review standards for military equipment design and military occupational specialties in order to accommodate female physical characteristics.

In the spring of 1978, the US Army Human Engineering Laboratory (USAHEL) conducted a Rate of Fire Study[1] to assess realistic rates of fire for some Soviet and US howitzers. Since the USAHEL had been directed to be the US Army Materiel Development and Readiness Command (DARCOM) lead laboratory in analyzing the effect of female performance on materiel acquisition, a pilot study was initiated to determine if female soldiers could meet the currently published rate of fire for several US howitzers.

OBJECTIVES

The objectives were:

1. To evaluate the female soldier's capability to perform specific tasks associated with loading, laying, and firing 105mm and 155mm howitzers.

2. To provide information on the potential of female soldiers to perform artillery related, physically demanding tasks. This evaluation was limited to specifically identified tasks and did not encompass all artillery MOS functions.

METHOD

The artillery weapons utilized in this study were the 105mm M101A1 and 155mm M114A1 howitzers. Differences between the howitzers included type of ammunition fired (fixed or separate loading), weight of projectiles (33 lbs versus 95 lbs), breech action, and ramming procedures. Both howitzers are manually operated and provide a means of evaluating handling and loading of ammunition by female soldiers.

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[1]Paragallo, F.R., Jr., & Dousa, W.J., Jr. US Army Human Engineering Laboratory rate of fire study. Technical Memorandum 9-79, US Army Human Engineering Laboratory, Aberdeen Proving Ground, MD, June 1979.

SUBJECTS

Thirteen female soldiers, all from administrative Army jobs and stationed at Aberdeen Proving Ground, MD, were used as test subjects. All subjects were volunteers and went through an interview and screening process prior to being selected. Subjects had to be in good physical condition with no current or past profile of ear, back, leg, knee, ankle, arm, wrist, or hand injuries. A vision profile was acceptable if correctable by the use of eyeglasses. All subjects were required to weigh at least 110 pounds.

CONTROLLERS/DATA COLLECTORS

The USAHEL provided two data controllers to monitor firings and time events; two camera operators to film all firing sequences from two different angles; three personnel to operate the audiometric test facility where hearing tests were conducted before and after firing, and two technicians with instrumentation to measure blast overpressure data from the weapons. The Materiel Testing Directorate (MTD) provided a test officer to insure that all safety procedures and range regulations were followed.

APPARATUS

Weapons

Quantity	Description
2	105mm, Model M101A1 howitzer, SN 8172 and 8173
2	155mm, Model M114A1 howitzer, SN 10265 and 10672

Ammunition

Quantity	Description
1000	105mm, Model M1, HE projectiles (inert-loaded)
1000	155mm, Model M107, HE projectiles (inert-loaded)
2000	M78 Dummy fuzes
1000	M67 Propelling charges
1000	M4A2 Propelling charges
1000	MK2A4 Percussion primers

FACILITIES

The test site was located at Aberdeen Proving Ground, MD. The howitzers were set up side by side, approximately 50 meters apart at the test site.

EQUIPMENT

Quantity	Description
2	Complete bili for 105mm M101A1 howitzer
2	Complete bili for 155mm M114A1 howitzer
3	DBM 4C Milliken motion picture cameras
1	Sony video tape recorder
5	Digital siliconex ET 100 stopwatches
3	Tape recorders
1	2-1/2-ton van truck
1	2-1/2-ton truck with scaffolding
1	Mobile audiometric test facility

PREPARATION PHASE

All major components of the weapons underwent magnetic particle inspection. The tubes were stargauged and borescoped. Periodic tests of on-carriage fire control were conducted on all weapons.

Prior to the first live firing, each crew member had her ears examined by a medical specialist to insure that ear canals were clear and healthy and that eardrums were intact. Ear canals were cleaned if required. All crew members were fitted with, and instructed in the use of the appropriate size triple-flange ear plugs. A baseline audiogram was established for each crew member by repeated testing in the mobile, audiometric test facility (ATF). The gun crews' hearing was then monitored during the firing tests by pre- and post-firing audiometric tests to insure that no one suffered permanent hearing losses.[2]

All projectiles and fuzes in this test were inert. A fixed quadrant elevation of 400 mils and a predetermined azimuth of fire were held throughout the testing. Firing was conducted using established field artillery gunnery procedures. The gun crews wore complete seasonal field uniform. For all firings, the projectiles were prefuzed and the propelling charges cut and stacked beside the weapon before firing.

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[2]Hodge, D.C., Price, G.R., Dukes, N.L., & Murff, S.J. Effects of artillery noise on the hearing of protected crew personnel. Technical Memorandum 17-79, US Army Human Engineering Laboratory, Aberdeen Proving Ground, MD, October 1979.

HOWITZER DESCRIPTION

The 105mm M101A1 towed howitzer (Figure 1), fires a 33-lb projectile to a maximum range of 11,500 meters. The published maximum rate of fire is 10 rounds/minute for the first 3 minutes and 3 rounds/minute thereafter. The weapon incorporates a horizontal sliding wedge breechblock which fires semifixed ammunition. The complete round--projectile and cartridge--is loaded into the weapon in one operation. The breech mechanism is operated manually.

Figure 1. 105mm M101A1 Howitzer.

The 155mm M114A1 towed howitzer (Figure 2), fires separate loading ammunition. The 95-lb, 155mm, M107 projectile can be fired to a range of 14,500 meters. The published rate of fire is 4 rounds/minute for the first 3 minutes and 1 round/minute sustained fire. The breechblock is of the stepped thread/interrupted screw type. To fire the howitzer, the breech is opened, the firing lock is removed, and a primer is inserted into the lock. A fuzed projectile is placed on the loading tray and carried to the breech by two crew members. The loading tray is positioned in the breech recess and rammed with a two-man staff. The propelling charge is then inserted and the breech is closed. The firing lock is then inserted and seated, the lanyard is attached, and the piece is ready to fire.

Figure 2. 155mm M114A1 Howitzer.

TRAINING

The female soldiers participated in an intensive 3-week physical conditioning and training program. A complete description of this program can be found in USAHEL Technical Note 11-78, "Ammunition Loading and Firing Test Pretest-Physical Conditioning of Female Soldier Participants." Concurrent with the physical conditioning program, hands-on training with mockup howitzers and inert rounds was conducted to teach the basics of field artillery gunnery techniques. Crew position assignments were made, based on individual capabilities demonstrated during this phase. At the conclusion of the physical conditioning program, service of the piece drills--on the actual howitzer--were conducted. Once the subjects had demonstrated a proficiency in the tasks expected of them, live training firings were conducted. At this point, the subjects were divided into two crews for testing.

TEST MATRIX

The test matrix was designed to determine if female soldiers could meet the published rate of fire for each of the howitzers. Each crew fired the 105mm howitzer and the 155mm howitzer on several occasions. On the 105mm howitzer, the first 30 rounds of each mission were fired at the published burst rate of fire (10 rounds per minute) for that weapon. The additional rounds were fired at the published sustained rate (4 rounds per minute). A similar procedure was followed for the 155mm howitzer, firing the first 12 rounds at the published burst rate (4 rounds per minute) and then firing additional rounds at the published sustained rate (1 round per minute).

This procedure was adhered to during the early firing phase; however, during later firing, some of the rate restrictions were removed to determine maximum firing rates for the female soldiers. (Table 1)

PROCEDURE

Test Procedure

At the start of each day, subjects and control personnel assembled at the firing point for instructions. The crew which was to fire the mission had audiogram tests performed while control personnel set up the cameras, tape recorders, and other data gathering instrumentation. All ammunition to be used in the testing phase was prepared in advance. The projectiles were fuzed, charges cut, primers were readied, and all ammunition components were stacked alongside the weapon. When the hearing testing was completed, the gun crew positioned themselves in their appropriate places. The test

TABLE 1

Test Matrix

Cell	Crew	MSN	Weapon	Number Rounds/Cell
1	1	3	105	30
2	2	4	105	30
3	1	8	105	29
4	2	6	105	45
5	2	7	105	45
6	1	18	155	12
7	2	12	155	12
8	1	9	155	15
9	2	10	155	15
10	1	11	155	17
11	2	13	155	17
12	1	14	155	30
13	1	15	155	30
14	2	16	155	30
15	2	17	155	29

officer would then give a warning to alert the controllers to start the cameras, tape recorders, and other instrumentation. Fifteen seconds later, a signal was given to initiate the mission. The gun orders were called out to the chief of the section who, in turn, called them out to the crew. Once the first round was loaded and ready to fire, the test officer gave the command to fire. From that point on the section chief, an experienced artilleryman, would control the rate of fire for the howitzer. At the conclusion of the mission, the test officer would signal to terminate all data recording. Upon completion of the mission, the crew would immediately go to the ATF van and have their post-firing audiogram.

Data Acquisition

A 2-1/2-ton truck, positioned to the rear of the firing area, served as a mobile control and instrumentation center for the acquisition of the blast overpressure data. The mobile audiometric test facility was positioned approximately 150 meters to the rear of the weapons, behind a barricade bunker.

All missions were filmed from two different camera locations. One camera was positioned approximately 20' high on scaffolding mounted on a 2-1/2-ton truck. The truck was placed to the rear and slightly off-center of the howitzer firing the mission. The second camera was located at ground level on the opposite side of the weapon from camera #1. It was positioned approximately 10 meters behind and 10 meters to the side of the trunnion. (Figure 3.) The cameras were turned on 15 seconds prior to the start of the mission.

Figure 3. Camera positions.

Data from all missions were tape recorded. These data included the call for fire and fire commands, the shot cycle times, and comments by the data collector as he timed and observed the fire missions.

Baseline audiograms were established on all subjects prior to firing. During actual testing, pre- and post-firing audiograms were taken and all subjects were monitored for signs of hearing loss. They would not be allowed to continue the test unless their hearing returned to their baseline levels. No significant hearing losses were noted during the test.

Data Reduction

Data reduction and analysis were performed on the motion picture films. Timing data for specific events were obtained by reading the film on a film analyzer and counting the frames between the start and the end of an event. The frame counts thus obtained were then converted into real time. The information obtained from the tape recordings was used to help verify data from the films and explain events that were taking place during filming of the missions.

Appendix A has a complete listing and explanation of the data gathered from the films for all firings.

RESULTS AND DISCUSSION

The round-to-round times and total mission times are shown in Tables 2 and 3.

TABLE 2

Mission Times for the 105mm Howitzer

Mission No.	No. Rounds Fired	Mean Time Between Rounds (Seconds)	Total Time for All Rounds (Minutes)	Crew
3	30	5.45	2.63	1
4	30	4.71	2.28	2
6	45	8.05	5.90	2
7	45	7.91	5.80	2
8	29	4.53	2.11	1

TABLE 3

Mission Times for the 155mm Howitzer

Mission No.	No. Rounds Fired	Mean Time Between Rounds (Seconds)	Total Time for All Rounds (Minutes)	Crew
9	15	12.96	3.02	1
10	15	13.56	3.16	2
11	17	23.30	6.21	1
12	12	12.28	2.25	2
13	17	21.65	5.77	2
14	30	10.78	5.21	1
15	30	10.61	5.13	1
16	30	10.46	5.06	2
17	29	16.25	7.58	2
18	12	12.78	2.34	1

During the first two 105mm missions, the published burst rate of fire was adhered to. No problems arose and both missions were successfully completed. The female soldiers had no problems handling, ramming, or firing 105mm ammunition. During these firing, crew assignments within a given crew were rotated. No degradation in crew performance was noted.

The 155mm howitzer, however, posed a problem. Subjects were assigned their tasks based on physical strength and size. Using the standard 155mm lifting tray, all subjects--in pairs--were able to lift and carry a 95-lb projectile from the ammunition stack to the howitzer (approximately 3-5 meters). (Figure 4.) The problem arose, however, when two individuals of different height (as much as 14") attempted to lift the tray into the breech recess (approximately 46" from the ground), the shorter individuals

Figure 4. Subjects carrying the 155mm projectile.

had trouble lifting the tray chest high. Consequently, the tallest females were used to carry the trays. The three subjects who had trouble lifting the tray to the proper height were 4'7", 5'1", and 5'2" in stature. The subjects used to carry the trays and projectiles were all over 5'4". Two other areas requiring strength--that of opening the breech and ramming the projectile with a standard 155mm staff--posed no problem with proper training techniques (Figure 5).

Figure 5. Subjects ramming the 155mm projectile.

For a burst of 12 rounds, both crews averaged 5 rounds/minute from a sample of 9 missions. Therefore, no difficulty in meeting the published rate of fire for the burst rate was noted. Because of the ease with which these missions were fired, permission was obtained from the Human Use Committee to modify the test program for the sustained fire missions. The remaining four missions were increased to a total of 30 rounds and the crews were allowed to fire as quickly as they could. All the missions were successfully completed. The average rate of fire was also 5 rounds/minute.

Although this study was very limited in nature and addressed only the ability of the female soldier to handle, load, and fire selected howitzers, additional tasks were performed from necessity. Two aspects of gunnery techniques introduced were cleaning the weapons at the conclusion of the firing day, and breaking down and re-emplacing the 105mm howitzer. The female soldiers showed the ability and aptitude to handle all artillery assignments given them.

CONCLUSIONS AND RECOMMENDATIONS

1. Female soldiers successfully meet the published rates of fire on the 105mm M101A1 and 155mm M114A1 howitzers.

2. Although this study did not encompass all tasks required of artillery MOS's, the subjects exhibited the ability and aptitude to perform the tasks assigned them.

3. It is recommended that additional studies addressing all artillery MOS tasks be performed with female soldiers to evaluate their full potential in the field of artillery.

APPENDIX

COMPUTER DATA SHEETS

Computer Printout of Film Data

This appendix contains a complete listing of all data reduction performed on the motion picture films. All times given are in seconds and hundredths of a second. They represent times between specific events. All missions were divided into 10-round segments. The computer sheets give a round-by-round breakdown for specific events (Col A, Col B, etc.) and then the mean and median are computed at the end of each 10 rounds. A total mean and median are computed at the end of all rounds fired. All missions are coded by the caliber and mission number at the top of the page; i.e., M105-01. An explanation of the first mission-a 105mm firing-follows. Columns A-J represent the timing between specific events which are as follows:

A - Time between opening the breech and inserting the complete projectile.

B - Time between ramming projectile and closing the breech.

C - Time between closing the breech and firing the howitzer.

D - Time between ramming the projectile and firing the howitzer.

E - Time between closing the breech and firing the howitzer.

F - Time between successive picking up of the projectile from the stockpile.

G - Time between successive openings of the breech.

H - Time between successive ramming of projectiles.

I - Time between successive closings of the breech.

J - Time between sucscessive firings of the howitzer.

The explanation for the 155mm missions is as follows:

A - Same as for the 105mm.

B - Same as for the 105mm.

C - Time between inserting the propelling charge and closing the breech.

D - Time between ramming the round and closing the breech.

E - Time between opening the breech and closing the breech.

F - Time between closing the breech and firing the howitzer.

G - Time between ramming the projectile and firing the howitzer.

H - Time between opening the breech and firing the howitzer.

I - Time between picking the projectile up from the stockpile to firing the howitzer.

J - Time between successive picking up of projectiles from the stockpile.

K - Time between successive openings of the breech.

L - Time between successive ramming of projectiles.

M - Time between successive loading of propellant charge.

N - Time between successive closings of the breech.

O - Time between successive firings of the howitzer.

ANALYSIS OF DATA (F105 03)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	
1	0.00	0.37	3.50	3.88	0.00	4.00	0.00	6.25	6.25	5.00	
2	1.38	0.37	2.25	2.63	4.00	4.13	4.63	4.88	4.75	4.63	
3	1.63	0.25	2.13	2.38	4.00	3.63	4.75	4.75	5.13	5.38	
4	1.63	0.62	2.38	3.00	4.63	3.88	5.75	5.88	5.50	5.38	
5	1.75	0.25	2.25	2.50	4.25	10.00	5.00	6.50	6.75	6.13	
6	3.25	0.50	1.63	2.13	5.38	4.00	6.25	8.25	8.12	8.38	
7	5.25	0.37	1.87	2.25	7.50	8.88	8.25	5.00	5.00	5.13	
8	2.00	0.37	2.00	2.38	4.37	8.38	5.00	4.37	4.50	4.75	
9	1.38	0.50	2.25	2.75	4.13	5.38	5.00	6.13	6.00	7.25	
10	2.50	0.37	3.50	3.88	6.38						
	1.75	0.37	2.25	2.56	4.37	4.13	5.00	5.88	5.50	5.38	MEDIAN
	2.31	0.40	2.38	2.78	4.96	5.81	5.58	5.78	5.78	5.78	MEAN
11	2.00	0.25	2.50	2.75	4.75	4.37	7.13	6.63	6.50	5.50	
12	1.38	0.37	2.50	2.88	4.25	3.88	5.50	4.88	5.00	5.00	
13	1.75	0.37	2.13	2.50	4.25	4.75	5.25	5.62	5.62	5.25	
14	1.38	0.37	1.63	2.00	3.38	4.50	5.25	4.88	4.88	4.37	
15	1.50	0.37	1.75	2.13	3.63	5.38	4.13	4.25	4.25	4.37	
16	1.00	0.62	4.50	5.13	6.13	5.62	4.50	4.00	4.25	7.00	
17	1.50	0.37	2.25	2.63	4.13	4.75	6.75	7.25	7.00	4.75	
18	1.50	0.75	2.13	2.88	4.37	4.37	4.88	4.88	5.25	5.13	
19	2.13	0.25	1.87	2.13	4.25	6.13	5.25	5.88	5.38	5.13	
20	2.00	0.25	1.75	2.00	4.00	4.88	4.88	4.75	4.75	4.63	

	1.50	0.37	2.13	2.56	4.25	4.75	5.25	4.38	5.13	5.06	MEDIAN
	1.61	0.40	2.30	2.70	4.31	4.86	5.35	5.30	5.29	5.11	MEAN
21	1.50	0.25	4.50	4.75	6.25	5.38	4.75	4.25	4.25	7.00	
22	2.00	0.37	1.87	2.25	4.25	5.00	6.87	7.38	7.50	4.88	
23	1.63	0.25	2.00	2.25	3.88	4.25	4.88	4.50	4.37	4.50	
24	1.75	0.25	1.87	2.13	3.88	7.50	4.88	5.00	5.00	4.88	
25	1.87	0.37	1.87	2.25	4.13	4.25	4.75	4.88	5.00	5.00	
26	2.63	1.38	2.00	3.38	6.00	4.25	4.75	5.50	6.50	6.63	
27	2.75	1.87	2.13	4.00	6.75	5.25	6.75	6.87	7.38	7.50	
28	2.13	0.37	1.75	2.13	4.25	5.13	7.63	7.00	5.50	5.13	
29	2.00	0.25	2.00	2.25	4.25	8.88	4.88	4.75	4.63	4.88	
30	1.75	0.25	1.75	2.00	3.75	6.87	5.00	4.75	4.75	4.50	
	1.94	0.31	1.94	2.25	4.25	5.19	4.88	4.94	5.00	4.94	MEDIAN
	2.00	0.56	2.17	2.74	4.74	5.68	5.51	5.49	5.49	5.49	MEAN
	1.75	0.37	2.06	2.44	4.25	4.88	5.00	5.00	5.13	5.13	TOTAL MEDIAN
	1.96	0.45	2.28	2.74	4.66	5.44	5.47	5.51	5.51	5.45	TOTAL MEAN

						3.00	0.00	6.63	6.25	5.25	
2	3.13	0.25	1.37	2.13	4.25	4.13	5.00	5.38	5.38	6.25	
3	2.50	0.25	2.75	3.00	5.50	4.13	6.63	6.25	6.25	5.25	
4	2.13	0.25	1.75	2.00	4.13	6.50	4.75	4.63	4.75	4.63	
5	2.00	0.37	1.63	2.00	4.00	5.88	4.75	4.88	4.88	4.50	
6	2.13	0.37	1.25	1.63	3.75	5.50	4.50	4.63	4.50	5.00	
7	2.25	0.25	1.75	2.00	4.25	4.88	5.00	4.63	4.75	4.25	
8	1.87	0.37	1.25	1.63	3.50	4.50	4.25	4.37	4.37	4.37	
9	2.00	0.37	1.25	1.63	3.63	4.88	4.37	4.37	4.25	4.37	
10	2.00	0.25	1.38	1.63	3.63						
	2.13	0.31	1.69	2.00	4.00	4.88	4.75	4.63	4.75	4.63	MEDIAN
	2.11	0.34	1.77	2.11	4.07	4.82	4.91	5.08	5.04	4.88	MEAN
						4.63	4.50	4.50	4.75	4.88	
11	2.00	0.50	1.50	2.00	4.00	4.37	4.88	4.63	4.63	4.63	
12	1.75	0.50	1.50	2.00	3.75	4.37	4.63	4.88	4.63	4.63	
13	2.00	0.25	1.50	1.75	3.75	4.38	4.37	4.25	4.25	4.25	
14	1.37	0.25	1.50	1.75	3.63	4.37	4.37	4.13	4.37	4.37	
15	1.63	0.50	1.50	2.00	3.63	4.00	4.13	4.00	4.37	4.13	
16	1.87	0.37	1.25	1.63	3.50	4.88	4.37	4.25	4.25	4.63	
17	1.75	0.3	1.62	2.00	3.75	4.13	4.50	4.63	4.75	4.75	
18	1.87	0.50	1.37	2.13	4.00	5.13	5.00	5.13	5.13	5.00	
19	2.00	0.50	1.50	2.00	4.00	4.37	4.75	4.63	4.63	4.63	
20	1.87	0.50	1.50	2.00	3.88						

	1.87	0.50	1.50	2.00	3.75	4.37	4.50	4.56	4.63	4.63	MEDIAN
	1.86	0.43	1.50	1.92	3.79	4.51	4.56	4.55	4.57	4.59	MEAN
21	2.25	0.25	1.63	1.87	4.13	4.25	4.50	4.88	4.63	4.75	
22	1.75	0.50	1.38	1.87	3.63	5.38	4.88	4.37	4.63	4.37	
23	1.87	0.37	1.87	2.25	4.13	4.88	4.37	4.50	4.37	4.88	
24	1.87	0.62	1.63	2.25	4.13	4.88	5.13	5.13	5.38	5.13	
25	1.87	0.37	1.50	1.87	3.75	4.37	5.00	5.00	4.75	4.63	
26	1.63	0.87	1.50	2.38	4.00	4.25	4.37	4.13	4.63	4.63	
27	2.13	0.50	1.38	1.87	4.00	5.00	4.88	5.38	5.00	4.88	
28	2.00	0.37	1.63	2.00	4.00	4.63	4.63	4.50	4.37	4.63	
29	2.13	0.37	1.38	1.75	3.88	5.38	4.63	4.75	4.75	4.50	
30	2.00	0.37	1.38	1.75	3.75	5.13	4.50	4.37	4.37	4.37	
	1.94	0.37	1.50	1.87	4.00	4.88	4.63	4.63	4.63	4.63	MEDIAN
	1.75	0.46	1.52	1.99	3.94	4.81	4.69	4.70	4.69	4.68	MEAN
	2.00	0.37	1.50	2.00	3.88	4.63	4.63	4.63	4.63	4.63	TOTAL MEDIAN
	1.97	0.41	1.50	2.01	3.93	4.71	4.71	4.77	4.76	4.71	TOTAL MEAN

ANALYSIS OF DATA (F105 06)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	
1	0.00	0.50	3.12	3.63	0.00	3.88	0.00	6.25	6.00	4.13	
2	1.87	0.25	1.25	1.50	3.38	3.00	4.00	4.25	4.37	4.37	
3	2.13	0.37	1.25	1.63	3.75	7.50	4.37	4.50	4.25	4.37	
4	2.25	0.12	1.38	1.50	3.75	4.25	4.25	4.25	4.37	4.37	
5	2.25	0.25	1.38	1.63	3.88	4.88	4.50	4.25	4.37	4.37	
6	2.00	0.37	1.38	1.75	3.75	3.63	4.37	4.50	4.37	4.37	
7	2.13	0.25	1.38	1.63	3.75	3.38	4.37	4.00	4.00	4.88	
8	1.75	0.25	2.25	2.50	4.25	5.00	5.13	5.13	5.25	4.37	
9	1.75	0.37	1.38	1.75	3.50	4.63	4.75	4.88	4.88	5.25	
10	1.87	0.37	1.75	2.13	4.00						
	2.00	0.31	1.38	1.69	3.75	4.25	4.37	4.50	4.37	4.37	MEDIAN
	2.00	0.31	1.65	1.96	3.78	4.46	4.47	4.67	4.65	4.50	MEAN
11	1.75	0.37	1.50	1.87	3.63	4.25	4.88	4.75	4.75	4.50	
12	2.00	0.37	1.38	1.75	3.75	4.37	4.37	4.63	4.63	4.50	
13	2.13	0.25	1.25	1.50	3.63	5.13	4.37	4.50	4.37	4.25	
14	2.00	0.50	1.50	2.00	4.00	5.62	4.37	4.25	4.50	4.75	
15	1.87	0.25	1.38	1.63	3.50	3.75	4.75	4.63	4.37	4.25	
16	2.00	0.37	1.50	1.87	3.88	4.13	4.25	4.37	4.50	4.63	
17	2.00	0.25	1.50	1.75	3.75	5.13	4.63	4.63	4.50	4.50	
18	1.63	0.25	2.13	2.38	4.00	4.00	4.63	4.25	4.25	4.88	
19	2.00	0.37	1.38	1.75	3.75	5.50	4.63	5.00	5.13	4.37	
20	1.87	0.25	1.38	1.63	3.75	3.50	4.37	4.50	4.37	4.37	

	2.00	0.31	1.44	1.75	3.75	4.31	4.50	4.56	4.50	4.50	MEDIAN
	1.95	0.32	1.49	1.81	3.76	4.54	4.53	4.55	4.54	4.50	MEAN
						4.63	5.13	4.88	5.13	5.13	
21	1.87	0.50	1.38	1.87	3.75	4.88	4.50	4.37	4.25	4.25	
22	1.75	0.37	1.38	1.75	3.50	6.00	4.25	4.13	4.13	4.37	
23	1.63	0.37	1.63	2.00	3.63	7.13	4.50	5.50	5.38	5.25	
24	2.63	0.25	1.50	1.75	4.37	3.12	5.13	4.25	4.25	4.25	
25	1.75	0.25	1.50	1.75	3.50	4.13	4.13	4.37	4.37	4.50	
26	2.00	0.25	1.63	1.87	3.88	3.75	4.50	4.25	4.37	4.13	
27	1.75	0.37	1.38	1.75	3.50	4.37	4.13	4.63	4.63	4.88	
28	2.25	0.37	1.63	2.00	4.25	5.75	4.88	4.25	4.25	3.88	
29	1.63	0.37	1.25	1.63	3.25	4.13	3.88	4.50	4.50	4.75	
30	2.25	0.37	1.50	1.87	4.13						
	1.81	0.37	1.50	1.81	3.69	4.50	4.50	4.37	4.37	4.44	**MEDIAN**
	1.95	0.35	1.48	1.83	3.78	4.79	4.50	4.51	4.53	4.54	**MEAN**
						10.63	5.00	9.00	9.75	12.75	
31	6.25	1.13	4.50	5.62	11.88	2.63	12.50	8.12	7.25	14.75	
32	1.87	0.25	12.00	12.25	14.13	6.75	14.88	15.25	15.25	14.00	
33	2.25	0.25	10.75	11.00	13.25	3.00	14.00	13.38	13.63	15.62	
34	1.63	0.50	12.75	13.25	14.88	5.38	16.00	16.13	15.88	14.75	
35	1.75	0.25	11.63	11.88	13.63	23.75	14.25	14.25	14.38	15.50	
36	1.75	0.37	12.75	13.13	14.88	14.63	15.75	15.50	15.50	3.00	
37	1.50	0.37	0.25	0.62	2.13	27.63	15.38	15.62	15.62	27.38	
38	1.75	0.37	12.00	12.38	14.13	14.38	14.75	14.88	14.75	15.13	
39	1.87	0.25	12.38	12.63	14.50	16.63	15.38	15.38	15.38	15.13	
40	1.87	0.25	12.13	12.38	14.25						
	1.81	0.31	12.00	12.31	14.13	12.50	14.81	15.06	15.00	14.94	MEDIAN

	2.25	0.40	10.11	10.51	12.76	12.54	13.79	13.75	13.74	14.80	MEAN
41	1.75	0.25	12.75	13.00	14.75	8.12	15.00	14.88	14.88	15.50	
42	1.75	0.25	11.63	11.88	13.63	18.00	15.50	15.50	15.50	14.38	
43	1.50	0.25	13.13	13.38	14.88	16.75	14.38	14.13	14.13	15.62	
44	1.50	0.50	12.25	12.75	14.25	12.88	15.62	15.62	15.88	15.00	
45	1.87	0.25	12.00	12.25	14.13	14.13	14.88	15.25	15.00	14.75	
46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1.75	0.25	12.25	12.75	14.25	14.13	15.00	15.25	15.00	15.00	MEDIAN
	1.67	0.30	12.35	12.65	14.32	13.98	15.07	15.07	15.07	15.05	MEAN
	1.87	0.37	1.50	1.87	3.88	4.94	4.75	4.69	4.69	4.69	TOTAL MEDIAN
	2.00	0.34	4.64	4.99	7.01	7.47	7.89	7.85	7.85	8.05	TOTAL MEAN

ANALYSIS OF DATA - LOS

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	
1	0.00	0.25	2.13	2.38	0.00	4.88	0.00	5.25	5.38	4.63	
2	2.25	0.37	1.38	1.75	4.00	4.00	4.75	4.13	4.13	5.62	
3	1.63	0.37	2.88	3.25	4.88	3.12	5.62	5.62	5.62	4.25	
4	1.63	0.37	1.50	1.87	3.50	3.12	4.13	4.37	4.37	4.25	
5	1.87	0.37	1.38	1.75	3.63	4.37	4.50	4.00	4.00	4.13	
6	1.38	0.37	1.50	1.87	3.25	5.13	3.88	4.13	4.13	4.13	
7	1.63	0.37	1.50	1.87	3.50	4.00	4.13	4.00	4.00	4.13	
8	1.50	0.37	1.63	2.00	3.50	4.00	4.13	4.13	4.13	4.00	
9	1.50	0.37	1.50	1.87	3.38	3.88	4.00	4.13	4.13	4.13	
10	1.63	0.37	1.50	1.87	3.50						
	1.63	0.37	1.50	1.87	3.50	4.00	4.13	4.13	4.13	4.13	MEDIAN
	1.67	0.36	1.69	2.05	3.68	4.06	4.39	4.42	4.43	4.36	MEAN
11	1.87	0.25	1.38	1.63	3.50	4.00	4.25	4.50	4.37	4.25	
12	1.63	0.37	1.75	2.13	3.75	3.75	4.13	3.88	4.00	4.37	
13	1.75	0.25	1.50	1.75	3.50	4.25	4.25	4.37	4.25	4.00	
14	1.63	0.37	1.87	2.25	3.88	4.00	4.13	4.00	4.13	4.50	
15	2.13	0.37	1.87	2.25	4.37	4.50	4.63	5.13	5.13	5.13	
16	1.75	0.37	1.50	1.87	3.63	4.75	5.00	4.63	4.63	4.25	
17	1.87	0.25	1.63	1.87	3.75	5.25	4.25	4.37	4.25	4.37	
18	2.25	0.37	1.63	2.00	4.25	4.25	4.37	4.75	4.88	4.88	
19	1.63	0.37	2.13	2.50	4.13	4.75	5.00	4.37	4.37	4.88	
20	1.63	0.37	3.38	3.75	5.38	3.63	4.75	4.75	4.75	6.00	

	1.75	0.37	1.69	2.06	3.81	4.25	4.31	4.44	4.37	4.44	MEDIAN
	1.81	0.34	1.86	2.20	4.01	4.31	4.47	4.47	4.47	4.66	MEAN
21	1.63	0.37	1.75	2.13	3.75	5.00	5.88	5.88	5.88	4.25	
22	2.00	0.37	1.50	1.87	3.88	4.75	4.25	4.63	4.63	4.37	
23	2.13	0.25	2.00	2.25	4.37	5.38	4.37	4.50	4.37	4.88	
24	1.63	0.25	1.63	1.87	3.50	4.75	5.00	4.50	4.50	4.13	
25	2.50	0.37	1.50	1.87	4.37	4.37	4.00	4.88	5.00	4.88	
26	2.13	0.37	1.63	2.00	4.13	4.88	5.00	4.63	4.63	4.75	
27	2.25	0.37	1.75	2.13	4.37	5.00	4.75	4.88	4.88	5.00	
28	1.87	0.37	1.50	1.87	3.75	4.25	4.88	4.50	4.50	4.25	
29	2.38	0.25	1.38	1.63	4.00	4.37	4.25	4.75	4.63	4.50	
30	1.87	0.50	1.63	2.13	4.00	5.62	4.63	4.13	4.37	4.63	
	2.06	0.37	1.63	1.94	4.00	4.81	4.69	4.63	4.63	4.56	MEDIAN
	2.04	0.35	1.63	1.98	4.01	4.84	4.70	4.72	4.74	4.56	MEAN
31	1.75	0.37	2.13	2.50	4.25	4.13	4.63	4.50	4.37	4.88	
32	2.13	0.37	12.00	12.38	14.50	4.75	4.88	5.25	5.25	15.13	
33	1.63	0.25	11.88	12.13	13.75	6.63	15.50	15.00	14.88	14.75	
34	0.87	0.37	13.00	13.38	14.25	15.88	14.63	13.88	14.00	15.13	
35	1.38	0.25	12.63	12.88	14.25	14.38	15.13	15.62	15.50	15.13	
36	1.50	0.37	12.63	13.00	14.50	15.13	15.00	15.13	15.25	15.25	
37	1.38	0.25	12.50	12.75	14.13	15.50	15.38	15.25	15.13	15.00	
38	1.63	0.25	12.63	12.88	14.50	15.13	14.75	15.00	15.00	15.13	
39	1.75	0.50	12.13	12.63	14.38	15.62	15.13	15.25	15.50	15.00	
40	1.75	0.37	13.00	13.38	15.13	14.63	15.00	15.00	14.88	15.75	
	1.63	0.37	12.56	12.81	14.31	14.88	15.00	15.00	14.94	15.13	MEDIAN

	1.58	0.34	11.45	11.79	13.36	12.18	13.00	12.99	12.98	14.11	MEAN
41	1.50	0.50	12.13	12.63	14.13	15.25	15.75	15.50	15.62	14.75	
42	1.63	0.25	12.63	12.88	14.50	15.38	14.75	14.88	14.63	15.13	
43	2.13	0.37	12.50	12.88	15.00	15.00	15.00	15.50	15.62	15.50	
44	2.13	0.37	11.63	12.00	14.13	15.38	15.88	15.88	15.88	15.00	
45	1.87	0.25	12.38	12.63	14.50	15.13	14.75	14.50	14.38	15.13	
46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1.87	0.37	12.38	12.63	14.50	15.25	15.00	15.50	15.62	15.13	MEDIAN
	1.85	0.35	12.25	12.60	14.45	15.23	15.23	15.25	15.23	15.10	MEAN
	1.75	0.37	1.75	2.13	4.19	4.75	4.75	4.75	4.69	4.88	TOTAL MEDIAN
	1.78	0.35	5.06	5.40	7.26	7.41	7.74	7.68	7.68	7.91	TOTAL MEAN

ANALYSIS OF DATA (F105 08)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	
1	0.00	0.50	5.38	5.88	0.00	3.50	0.00	8.25	8.00	4.37	
2	1.75	0.25	1.75	2.00	3.75	3.38	4.50	4.75	4.75	4.88	
3	2.00	0.25	1.87	2.13	4.13	4.63	4.75	4.63	4.75	4.50	
4	1.87	0.37	1.63	2.00	3.88	6.75	4.63	4.37	4.25	4.13	
5	1.63	0.25	1.50	1.75	3.38	7.00	4.13	4.37	4.37	4.25	
6	1.87	0.25	1.38	1.63	3.50	3.63	4.13	5.38	5.38	5.50	
7	3.12	0.25	1.50	1.75	4.88	4.25	5.62	4.37	4.50	4.25	
8	1.87	0.37	1.25	1.63	3.50	5.13	4.13	4.25	4.25	4.37	
9	2.00	0.37	1.38	1.75	3.75	4.50	4.37	4.75	4.75	4.75	
10	2.38	0.37	1.38	1.75	4.13						
	1.87	0.31	1.50	1.75	3.75	4.50	4.44	4.63	4.75	4.37	MEDIAN
	2.06	0.32	1.90	2.22	3.88	4.75	4.53	5.01	5.00	4.56	MEAN
11	2.13	0.37	1.13	1.50	3.63	4.13	4.75	4.50	4.50	4.25	
12	1.75	0.50	1.25	1.75	3.50	4.25	4.37	4.00	4.13	4.25	
13	1.87	0.37	1.63	2.00	3.88	4.37	4.13	4.25	4.13	4.50	
14	2.88	0.37	1.50	1.87	4.75	5.25	4.50	5.50	5.50	5.38	
15	1.87	0.37	1.63	2.00	3.88	5.25	5.62	4.63	4.63	4.75	
16	2.00	0.37	1.25	1.63	3.63	4.75	4.50	4.63	4.63	4.25	
17	2.13	0.25	1.50	1.75	3.88	5.13	4.25	4.37	4.25	4.50	
18	2.00	0.37	1.50	1.87	3.88	4.75	4.50	4.37	4.50	4.50	
19	1.87	0.37	1.75	2.13	4.00	4.13	4.50	4.37	4.37	4.63	
20	1.75	0.37	1.50	1.87	3.63	3.38	4.88	4.75	4.75	4.50	

	1.94	0.37	1.50	1.87	3.88	4.56	4.50	4.44	4.50	4.50	MEDIAN
	2.03	0.37	1.46	1.84	3.86	4.54	4.60	4.54	4.54	4.55	MEAN
21	1.75	0.37	1.25	1.63	3.38	4.00	4.50	4.50	4.50	4.25	
22	1.63	0.25	1.63	1.87	3.50	4.13	4.13	4.00	3.88	4.25	
23	1.75	0.37	1.38	1.75	3.50	4.50	4.37	4.50	4.63	4.37	
24	1.50	0.50	1.75	2.25	3.75	4.50	4.37	4.13	4.25	4.63	
25	1.50	0.50	1.38	1.87	3.38	4.25	4.50	4.50	4.50	4.13	
26	1.50	0.37	1.50	1.87	3.38	4.00	4.13	4.13	4.00	4.13	
27	1.75	0.25	1.63	1.87	3.63	4.37	4.00	4.25	4.13	4.25	
28	2.88	0.37	1.38	1.75	4.63	4.63	4.37	5.50	5.62	5.38	
29	2.38	0.37	1.25	1.63	4.00	7.63	5.50	5.00	5.00	4.88	
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1.75	0.37	1.38	1.87	3.50	4.37	4.37	4.50	4.50	4.25	MEDIAN
	1.85	0.37	1.46	1.83	3.68	4.67	4.43	4.50	4.50	4.47	MEAN
	1.87	0.37	1.50	1.87	3.75	4.44	4.50	4.50	4.50	4.44	TOTAL MEDIAN
	1.98	0.36	1.61	1.97	3.81	4.65	4.52	4.68	4.67	4.53	TOTAL MEAN

ANALYSIS OF DATA (F155 09)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O	
1	0.00	1.50	1.75	3.25	0.00	3.88	7.13	0.00	11.63	12.50	0.00	13.00	12.75	12.38	12.25	
2	3.38	1.25	1.38	2.63	6.00	3.75	6.38	9.75	11.38	10.63	11.75	11.25	11.25	11.50	11.13	
3	2.88	1.25	1.63	2.88	5.75	3.38	6.25	9.13	11.88	11.75	11.75	11.13	11.25	15.13	15.00	
4	2.25	1.38	5.50	6.87	9.13	3.25	10.13	12.38	15.13	10.75	14.63	17.25	17.25	13.38	13.00	
5	4.88	1.38	1.63	3.00	7.88	2.88	5.88	10.75	17.38	17.38	13.50	11.38	11.13	12.13	12.25	
6	2.75	1.13	2.63	3.75	6.50	3.00	6.75	9.50	12.25	11.75	11.75	11.63	12.00	11.25	12.00	
7	2.63	1.50	1.87	3.38	6.00	3.75	7.13	9.75	12.50	11.63	11.88	12.13	12.00	11.63	11.13	
8	2.88	1.38	1.50	2.88	5.75	3.25	6.13	9.00	12.00	12.00	11.50	11.38	11.50	11.75	11.38	
9	2.75	1.50	1.75	3.25	6.00	2.88	6.13	8.88	11.38	12.13	11.25	11.75	12.13	11.88	12.13	
10	3.25	1.87	1.50	3.38	6.63	3.12	6.50	9.75	11.38							
	2.88	1.38	1.69	3.25	6.00	3.25	6.44	9.75	11.94	11.75	11.75	11.63	12.00	11.88	12.13	MEDIAN
	3.07	1.41	2.11	3.53	6.63	3.31	6.84	9.88	12.69	12.28	12.25	12.32	12.36	12.33	12.25	MEAN
11	5.00	12.38	1.13	13.50	18.50	2.88	16.38	21.38	22.13	12.75	11.88	13.63	24.13	23.75	23.50	
12	2.25	2.00	1.38	3.38	5.62	3.12	6.50	8.75	12.25	22.63	25.38	22.63	12.25	12.50	12.75	
13	3.50	1.13	1.38	2.50	6.00	2.75	5.25	8.75	10.25	12.88	10.88	12.13	11.25	11.25	10.88	
14	2.25	1.25	1.63	2.88	5.13	3.88	6.75	9.00	11.88	11.25	12.63	11.38	11.50	11.75	12.88	
15	3.63	1.25	1.38	2.63	6.25	2.50	5.13	8.75	10.75	12.25	11.38	12.75	12.75	12.50	11.13	
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

3.50	1.25	1.38	2.88	6.00	2.88	6.50	8.75	11.88	12.75	11.88	12.75	12.25	12.50	12.75	MEDIAN
3.33	3.60	1.38	4.97	8.30	3.03	8.00	11.32	13.45	14.35	14.43	14.50	14.38	14.35	14.23	MEAN
2.88	1.38	1.63	3.25	6.00	3.12	6.50	9.31	11.88	12.06	11.75	11.94	12.00	12.00	12.19	TOTAL MEDIAN
3.16	2.14	1.87	4.01	7.22	3.22	7.22	10.39	12.94	13.02	13.09	13.10	13.08	13.05	12.96	TOTAL MEAN

ANALYSIS OF DATA (F155 10)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O	
1	0.00	1.38	1.63	3.00	0.00	5.50	8.50	0.00	12.75	13.63	0.00	15.13	15.00	17.50	15.88	
2	3.38	1.25	4.13	5.38	8.75	3.88	9.25	12.63	15.00	15.13	15.88	15.25	15.38	13.25	13.50	
3	2.75	1.38	2.00	3.38	6.13	4.13	7.50	10.25	13.38	13.75	13.38	13.25	13.25	13.25	13.25	
4	2.63	1.38	2.00	3.38	6.00	4.13	7.50	10.13	12.88	13.13	12.63	15.88	15.62	15.13	16.75	
5	5.88	1.13	1.50	2.63	8.50	5.75	8.38	14.25	16.50	15.25	17.63	14.25	14.25	14.75	14.25	
6	2.50	1.13	2.00	3.12	5.62	5.25	8.38	10.88	15.50	15.75	15.88	17.00	17.25	18.50	17.25	
7	3.63	1.38	3.25	4.63	8.25	4.00	8.63	12.25	17.00	17.50	14.50	15.00	15.13	14.00	13.63	
8	4.13	1.50	2.13	3.63	7.75	3.63	7.25	11.38	13.13	13.75	13.63	12.63	12.38	11.75	11.88	
9	3.12	1.25	1.50	2.75	5.88	3.75	6.50	9.63	11.25	11.88	12.00	12.00	11.75	12.25	11.88	
10	3.12	1.00	2.00	3.00	6.13	3.38	6.38	9.50	11.25							
	3.12	1.31	2.00	3.25	6.13	4.06	7.94	10.88	13.25	13.75	14.06	15.00	15.00	14.00	13.63	MEDIAN
	3.46	1.27	2.21	3.49	7.00	4.34	7.82	11.21	13.86	14.42	14.44	14.49	14.44	14.49	14.25	MEAN
11	3.12	1.25	1.63	2.88	6.00	4.63	7.50	10.63	12.00	12.13	11.75	11.75	12.00	11.63	12.88	
12	2.75	1.25	1.87	3.12	5.88	3.88	7.00	9.75	11.75	12.13	12.75	12.38	12.38	12.63	11.88	
13	2.50	1.13	2.50	3.63	6.13	3.50	7.13	9.63	12.13	11.88	12.38	12.13	12.00	12.63	12.25	
14	2.75	1.38	1.13	2.50	5.25	3.75	6.25	9.00	11.38	12.38	12.25	12.50	12.75	11.38	11.63	
15	3.00	1.25	2.88	4.13	7.13	3.88	8.00	11.00	12.75	11.63	11.00	11.25	11.13	12.88	13.00	
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

2.75	1.25	1.87	3.12	6.00	3.88	7.13	9.75	12.00	12.13	12.25	12.13	12.00	12.63	12.25	MEDIAN
2.83	1.25	2.00	3.25	6.07	3.92	7.18	10.00	12.00	12.02	12.02	12.00	12.05	12.23	12.32	MEAN
3.06	1.25	2.00	3.12	6.13	3.88	7.50	10.44	12.75	13.38	12.75	12.94	13.00	13.06	13.13	TOTAL MEDIAN
3.23	1.27	2.14	3.41	6.67	4.20	7.61	10.78	13.24	13.56	13.51	13.60	13.59	13.68	13.56	TOTAL MEAN

ANALYSIS OF DATA (F155 11)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O	
1	0.00	1.87	2.00	3.88	0.00	3.00	6.87	0.00	11.88	12.88	0.00	13.88	13.38	13.63	14.50	
2	5.13	1.38	2.25	3.63	8.75	3.88	7.50	12.63	13.50	14.50	15.13	14.50	14.38	14.00	13.00	
3	4.50	1.25	1.87	3.12	7.63	2.88	6.00	10.50	12.00	12.63	12.38	12.50	12.38	12.50	12.63	
4	4.63	1.13	2.00	3.12	7.75	3.00	6.13	10.75	12.00	12.75	13.63	12.13	12.25	12.38	13.63	
5	3.12	1.25	2.13	3.38	6.50	4.25	7.63	10.75	12.88	12.00	12.88	16.25	16.25	15.88	14.75	
6	6.50	1.25	1.75	3.00	9.50	3.12	6.13	12.63	15.62	16.38	14.63	13.63	14.38	14.75	14.25	
7	5.50	2.00	2.13	4.13	9.63	2.63	6.75	12.25	13.50	14.25	14.13	12.13	12.25	12.25	13.88	
8	3.50	2.13	2.13	4.25	7.75	4.25	8.50	12.00	13.13	13.25	14.50	16.50	17.88	17.63	17.63	
9	5.50	3.50	1.87	5.38	10.88	4.25	9.63	15.13	17.50	17.50	18.00	14.75	13.00	13.00	11.50	
10	2.25	1.75	1.87	3.63	5.88	2.75	6.38	8.63	11.50							
	4.63	1.56	2.00	3.63	7.75	3.06	6.81	12.00	13.00	13.25	14.31	13.88	13.38	13.63	13.88	MEDIAN
	4.51	1.75	2.00	3.75	8.25	3.40	7.15	11.69	13.35	14.01	14.41	14.03	14.01	14.00	13.97	MEAN
11	4.00	1.87	1.75	3.63	7.63	3.50	7.13	11.13	12.38	12.38	13.75	12.50	12.63	12.50	13.25	
12	3.12	4.13	1.87	6.00	9.13	2.63	8.63	11.75	14.00	12.50	13.50	12.63	14.88	15.00	14.13	
13	6.63	3.12	2.38	5.50	12.13	28.75	34.25	40.88	42.75	15.88	15.50	19.00	18.00	18.50	44.63	
14	5.00	3.00	1.87	4.88	9.88	31.75	36.63	41.63	41.75	44.75	43.00	41.38	41.25	40.75	43.75	
15	6.13	2.25	1.63	3.88	10.00	31.38	35.25	41.38	42.13	43.50	44.13	45.25	44.50	44.25	43.88	
16	5.88	1.63	2.00	3.63	9.50	31.75	35.38	41.25	40.13	45.63	43.75	43.50	42.88	43.25	43.63	
17	5.62	1.25	1.75	3.00	8.63	32.88	35.88	41.50	41.63	42.38	43.63	43.38	43.00	42.75	43.88	
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

5.62	2.25	1.87	3.88	9.50	31.38	35.25	41.25	41.63	42.38	43.00	41.38	41.25	40.75	43.75	MEDIAN
5.20	2.46	1.89	4.36	9.55	23.23	27.59	32.79	33.54	31.00	30.61	31.09	31.02	31.00	35.30	MEAN
5.06	1.87	1.87	3.63	8.94	3.88	7.63	12.44	13.50	14.38	14.63	14.63	14.63	14.88	14.38	TOTAL MEDIAN
4.81	2.04	1.96	4.00	8.82	11.57	15.57	20.92	21.66	21.45	21.97	21.49	21.45	21.44	23.30	TOTAL MEAN

ANALYSIS OF DATA (F155 XX)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O	
1	0.00	1.25	1.50	2.75	0.00	3.00	5.75	0.00	10.75	11.00	0.00	10.25	10.88	10.75	10.13	
2	2.13	1.87	1.38	3.25	5.38	2.38	5.62	7.75	9.88	10.00	10.25	9.75	9.13	9.13	9.25	
3	1.63	1.25	1.38	2.63	4.25	2.50	5.13	6.75	9.13	9.37	8.50	9.13	9.25	9.50	9.37	
4	2.25	1.38	1.63	3.00	5.25	2.38	5.38	7.63	9.13	9.00	9.63	9.13	9.37	12.50	12.50	
5	1.75	1.63	4.75	6.38	8.12	2.38	8.75	10.50	12.63	10.00	12.38	15.25	15.75	12.50	12.75	
6	4.63	2.13	1.50	3.63	8.25	2.63	6.25	10.88	15.38	15.50	12.75	10.38	9.88	9.75	9.63	
7	2.25	1.63	1.38	3.00	5.25	2.50	5.50	7.75	9.50	10.13	9.63	10.50	10.38	10.50	10.63	
8	3.12	1.50	1.50	3.00	6.13	2.63	5.62	8.75	10.00	9.88	10.63	13.25	13.63	13.63	13.88	
9	5.75	1.87	1.50	3.38	9.13	2.88	6.25	12.00	14.00	13.88	14.00	13.50	20.63	21.00	22.00	
10	5.25	9.00	1.87	10.88	16.13	3.88	14.75	20.00	22.13							
	2.25	1.63	1.50	3.12	6.13	2.56	5.69	8.75	10.38	10.00	10.44	10.38	10.38	10.75	10.63	MEDIAN
	3.19	2.35	1.84	4.19	7.54	2.71	6.90	10.22	12.25	10.97	10.97	11.24	12.10	12.14	12.24	MEAN
11	2.50	1.87	1.75	3.63	6.13	3.00	6.63	9.13	12.38	20.88	22.00	19.25	12.13	12.00	11.13	
12	9.88	3.38	1.75	5.13	15.00	2.50	7.63	17.50	18.25	13.50	11.00	18.38	19.88	19.88	19.38	
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

6.19	2.63	1.75	4.37	10.56	2.75	7.13	13.31	15.31	17.19	16.50	18.81	16.00	15.94	15.25	MEDIAN
6.19	2.63	1.75	4.37	10.56	2.75	7.13	13.31	15.31	17.19	16.50	18.81	16.00	15.94	15.25	MEAN
2.50	1.75	1.50	3.31	6.13	2.56	6.00	9.13	11.56	10.13	10.81	10.50	10.88	12.00	11.13	TOTAL MEDIAN
3.74	2.40	1.82	4.22	8.09	2.72	6.94	10.78	12.76	12.10	12.07	12.61	12.81	12.83	12.78	TOTAL MEAN

ANALYSIS OF DATA (F155 L2)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O
1	0.00	2.75	1.50	4.25	0.00	3.50	7.75	0.00	11.88	12.13	0.00	14.38	14.25	13.88	14.75
2	2.25	2.63	1.13	3.75	6.00	4.37	8.12	10.38	14.50	14.75	12.63	12.63	12.13	12.13	11.38
3	2.25	2.13	1.13	3.25	5.50	3.63	6.87	9.13	11.13	11.25	11.25	11.00	10.88	11.00	10.13
4	2.00	2.00	1.25	3.25	5.25	2.75	6.00	8.00	10.00	11.25	10.13	12.38	12.50	12.63	12.75
5	4.25	2.13	1.38	3.50	7.75	2.88	6.38	10.63	11.50	11.88	12.50	10.50	10.88	10.75	10.88
6	2.25	2.50	1.25	3.75	6.00	3.00	6.75	9.00	10.50	11.13	11.13	11.25	10.38	16.25	16.50
7	2.38	1.63	7.13	8.75	11.13	3.25	12.00	14.38	15.88	13.75	16.75	16.00	16.50	10.63	10.38
8	1.63	2.13	1.25	3.38	5.00	3.00	6.38	8.00	12.50	13.88	11.25	11.75	12.00	12.50	13.25
9	2.13	2.38	1.75	4.13	6.25	3.75	7.88	10.00	11.88	11.75	12.50	13.88	14.00	13.63	12.75
10	3.50	2.50	1.38	3.88	7.38	2.88	6.75	10.25	12.88						
	2.25	2.25	1.31	3.75	6.00	3.12	6.81	10.00	11.88	11.88	11.88	12.38	12.13	12.50	12.75	MEDIAN
	2.51	2.28	1.91	4.19	6.69	3.30	7.49	9.97	12.26	12.42	12.27	12.64	12.61	12.60	12.53	MEAN
11	2.75	2.13	1.50	3.63	6.38	2.88	6.50	9.25	10.63	14.00	12.75	12.00	11.63	11.75	11.75
12	2.25	2.25	1.25	3.50	5.75	2.88	6.38	8.63	10.00	11.25	11.25	10.75	10.88	10.63	10.63
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.50	2.19	1.38	3.56	6.06	2.88	6.44	8.94	10.31	12.63	12.00	11.38	11.25	11.19	11.19	MEDIAN
2.50	2.19	1.38	3.56	6.06	2.88	6.44	8.94	10.31	12.63	12.00	11.38	11.25	11.19	11.19	MEAN
2.25	2.19	1.31	3.69	6.00	3.00	6.75	9.25	11.69	11.88	11.88	12.00	12.00	12.13	11.75	TOTAL MEDIAN
2.51	2.26	1.82	4.08	6.58	3.23	7.31	9.78	11.94	12.45	12.21	12.41	12.36	12.34	12.28	TOTAL MEAN

ANALYSIS OF DATA (F155 13)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O	
1	0.00	2.25	1.87	4.13	0.00	3.63	7.75	0.00	11.63	11.75	0.00	11.63	11.50	10.75	11.00	
2	1.87	2.13	1.13	3.25	5.13	3.88	7.13	9.00	10.88	10.88	11.00	10.88	10.88	10.75	9.63	
3	1.75	2.13	1.00	3.12	4.88	2.75	5.88	7.63	9.63	10.38	9.50	13.00	14.00	14.13	14.25	
4	5.25	3.12	1.13	4.25	9.50	2.88	7.13	12.38	13.50	13.63	14.63	11.25	10.50	10.50	10.63	
5	1.87	2.38	1.13	3.50	5.38	3.00	6.50	8.38	10.50	11.25	10.38	18.25	18.13	18.25	17.88	
6	9.75	2.25	1.25	3.50	13.25	2.63	6.13	15.88	17.13	18.88	18.00	11.25	10.88	11.00	11.75	
7	3.00	1.87	1.38	3.25	6.25	3.38	6.63	9.63	10.00	10.50	11.50	10.63	10.75	10.50	10.25	
8	2.13	2.00	1.13	3.12	5.25	3.12	6.25	8.38	9.75	9.88	10.38	10.00	10.00	10.50	9.88	
9	1.75	2.00	1.63	3.63	5.38	2.50	6.13	7.88	9.75	10.13	10.25	10.13	10.38	9.88	10.00	
10	1.63	2.25	1.13	3.38	5.00	2.63	6.00	7.63	9.63							
	1.87	2.19	1.13	3.44	5.38	2.94	6.38	8.38	10.25	10.88	10.69	11.25	10.88	10.75	10.63	MEDIAN
	3.22	2.24	1.27	3.51	6.67	3.04	6.55	9.64	11.24	11.92	11.95	11.89	11.89	11.81	11.69	MEAN
11	2.00	2.00	1.38	3.38	5.38	3.25	6.63	8.63	10.13	10.25	9.75	10.13	9.88	10.13	10.75	
12	1.38	2.25	1.38	3.63	5.00	2.50	6.13	7.50	9.88	9.75	10.63	10.00	10.25	10.25	9.50	
13	2.00	2.00	1.38	3.38	5.38	34.37	37.75	39.75	41.63	11.13	10.63	11.25	11.00	11.00	42.88	
14	4.37	2.38	2.25	4.63	9.00	33.50	38.13	42.50	43.25	42.88	41.75	44.13	44.50	45.38	44.50	
15	5.00	1.87	1.38	3.25	8.25	34.13	37.38	42.38	41.25	46.50	44.63	45.25	44.75	43.88	44.50	
16	5.13	2.13	1.75	3.88	9.00	33.25	37.13	42.25	40.75	45.00	44.63	44.75	45.00	45.38	44.50	
17	5.00	2.25	1.75	4.00	9.00	33.63	37.63	42.63	41.75	43.50	44.13	44.00	44.13	44.13	44.50	
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

4.37	2.13	1.38	3.63	[illegible]	[illegible]	37.38	41.5	41.25	42.88	41.75	44.00	44.13	43.88	44.50	MEDIAN
3.55	2.13	1.41	3.73	[illegible]	24.75	28.68	32.33	32.66	29.86	29.45	29.93	29.93	30.02	34.45	MEAN
2.06	2.13	1.38	3.50	5.38	3.25	6.63	9.31	10.88	11.19	11.00	11.25	10.94	10.88	11.38	TOTAL MEDIAN
3.37	2.19	1.41	3.60	6.94	12.06	15.66	19.52	20.06	19.77	20.12	19.78	19.78	19.77	21.65	TOTAL MEAN

ANALYSIS OF DATA (F155 14)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O
1	0.00	0.00	1.50	0.00	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	11.63	11.25	11.38
2	2.25	1.38	1.13	2.50	4.75	4.13	6.63	8.88	11.88	11.25	10.88	10.63	10.25	10.75	9.37
3	2.00	1.00	1.63	2.63	4.63	2.75	5.38	7.38	10.00	9.63	9.25	9.00	9.75	9.25	9.00
4	1.75	1.75	1.13	2.88	4.63	2.50	5.38	7.13	9.37	9.63	9.63	9.37	9.13	15.50	15.75
5	1.50	1.50	7.50	9.00	10.50	2.75	11.75	13.25	15.50	9.25	15.25	15.38	15.75	9.50	10.38
6	1.63	1.87	1.25	3.12	4.75	3.63	6.75	8.38	16.63	16.63	10.25	10.88	10.75	17.88	18.13
7	2.25	1.75	8.38	10.13	12.38	3.88	14.00	16.25	18.13	17.00	18.50	18.13	17.63	10.75	10.25
8	1.87	1.25	1.50	2.75	4.63	3.38	6.13	8.00	11.38	10.75	10.00	12.00	12.63	12.38	12.00
9	3.88	1.87	1.25	3.12	7.00	3.00	6.13	10.00	12.63	13.38	12.38	10.38	10.38	10.00	10.13
10	1.87	1.87	0.87	2.75	4.63	3.12	5.88	7.75	9.37						
	1.87	1.75	1.38	2.88	4.75	3.25	6.13	8.38	11.88	11.00	10.56	10.75	10.75	10.75	10.38	MEDIAN
	2.11	1.58	2.61	4.32	6.43	3.31	7.56	9.67	12.76	12.19	12.02	11.97	11.99	11.92	11.82	MEAN
11	1.50	1.63	1.50	3.12	4.63	2.75	5.88	7.38	9.63	9.25	9.88	9.50	9.25	9.88	9.50
12	1.38	1.63	1.50	3.12	4.50	3.50	6.63	8.00	10.38	9.25	9.37	9.25	9.25	9.25	10.00
13	4.25	1.75	3.38	5.13	9.37	3.12	8.25	12.50	15.50	9.13	9.75	12.63	12.75	14.63	14.25
14	1.38	1.75	1.63	3.38	4.75	2.50	5.88	7.25	10.00	14.75	14.50	11.63	11.63	9.88	9.25
15	1.75	1.63	3.50	5.13	6.87	3.50	8.63	10.38	12.25	10.00	9.13	9.50	9.37	11.25	12.25
16	1.50	2.00	1.25	3.25	4.75	2.75	6.00	7.50	12.13	9.88	12.63	12.38	12.75	10.50	9.75
17	1.75	1.63	2.88	4.50	6.25	2.88	7.38	9.13	10.63	12.63	9.50	9.75	9.37	11.00	11.13
18	1.00	1.75	2.50	4.25	5.25	2.63	6.87	7.88	11.13	9.63	11.38	10.63	10.75	10.38	10.13
19	4.00	1.87	1.25	3.12	7.13	2.50	5.62	9.63	12.88	10.25	10.25	13.25	13.38	12.13	12.00
20	1.75	1.63	1.25	2.88	4.63	2.38	5.25	7.00	8.88	13.25	11.88	9.63	9.37	9.37	9.25

	1.63	1.69	1.56	3.31	5.00	2.75	6.31	7.94	10.88	9.94	10.06	10.19	10.06	10.44	10.06	MEDIAN
	2.03	1.73	2.06	3.79	5.81	2.85	6.64	8.66	11.34	10.80	10.82	10.81	10.79	10.82	10.75	MEAN
21	2.38	1.75	1.25	3.00	5.38	2.50	5.50	7.88	9.00	9.63	8.88	9.50	9.63	9.63	9.75	
22	1.75	1.75	1.25	3.00	4.75	2.75	5.75	7.50	8.88	9.50	9.75	9.13	9.13	9.13	9.37	
23	1.50	1.50	2.88	4.37	5.88	3.38	7.75	9.25	11.25	8.88	9.50	9.25	9.00	10.63	11.25	
24	1.38	1.25	2.00	3.25	4.63	3.63	6.87	8.25	11.88	9.88	11.50	11.38	11.13	10.25	10.50	
25	1.50	1.63	1.13	2.75	4.25	3.25	6.00	7.50	10.75	10.50	10.13	10.25	10.63	9.75	9.37	
26	3.88	1.75	1.38	3.12	7.00	3.00	6.13	10.00	12.00	10.63	9.37	11.75	11.88	12.13	11.88	
27	2.00	1.63	1.13	2.75	4.75	2.63	5.38	7.38	8.88	12.50	12.00	10.13	10.00	9.75	9.37	
28	2.13	1.75	1.13	2.88	5.00	2.38	5.25	7.38	8.38	9.75	9.25	9.37	9.50	9.50	9.25	
29	1.75	1.50	1.38	2.88	4.63	2.38	5.25	7.00	8.38	8.75	9.13	8.75	8.50	8.75	8.75	
30	1.75	1.75	1.25	3.00	4.75	2.63	5.62	7.38	8.75	8.75	8.75	8.75	9.00	8.88	9.13	
	1.75	1.69	1.25	3.00	4.75	2.69	5.69	7.50	8.94	9.69	9.44	9.44	9.56	9.69	9.37	MEDIAN
	2.00	1.63	1.48	3.10	5.10	2.85	5.95	7.95	9.81	9.88	9.82	9.82	9.84	9.84	9.86	MEAN
	1.75	1.75	1.38	3.12	4.75	2.81	6.00	7.88	10.75	9.88	9.94	10.19	10.25	10.25	10.13	TOTAL MEDIAN
	2.04	1.65	2.05	3.72	5.76	3.00	6.69	8.73	11.25	10.87	10.81	10.79	10.83	10.82	10.78	TOTAL MEAN

ANALYSIS OF DATA (FISS 5)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O
1	0.00	2.13	1.13	3.25	0.00	5.88	9.13	0.00	13.25	10.00	0.00	12.75	12.63	12.88	10.63
2	1.87	2.00	1.38	3.38	5.25	3.63	7.00	8.88	13.88	13.00	10.75	9.88	9.75	9.75	8.88
3	1.00	1.87	1.38	3.25	4.25	2.75	6.00	7.00	9.75	9.88	8.75	9.25	9.50	9.37	10.00
4	1.50	2.13	1.25	3.38	4.88	3.38	6.75	8.25	9.88	9.37	10.13	9.88	9.63	10.13	9.50
5	1.25	1.87	1.75	3.63	4.88	2.75	6.38	7.63	10.00	9.13	9.63	9.63	9.63	9.13	17.63
6	1.25	1.87	1.25	3.12	4.37	11.25	14.38	15.62	18.50	9.88	18.00	17.88	18.00	18.63	10.00
7	1.13	2.00	1.87	3.88	5.00	2.63	6.50	7.63	18.63	18.38	10.00	12.13	11.88	11.25	11.38
8	3.25	1.75	1.25	3.00	6.25	2.75	5.75	9.00	11.63	11.88	10.88	10.13	10.25	10.50	9.88
9	2.50	1.87	1.50	3.38	5.88	2.13	5.50	8.00	9.63	10.13	10.00	9.25	9.00	8.75	10.00
10	1.75	1.63	1.25	2.88	4.63	3.38	6.25	8.00	9.50						
	1.50	1.87	1.31	3.31	4.88	3.06	6.44	8.00	10.81	10.00	10.06	9.88	9.75	10.13	10.00 MEDIAN
	1.72	1.91	1.40	3.31	5.04	4.05	7.36	8.89	12.46	11.29	11.02	11.19	11.14	11.15	10.88 MEAN
11	1.38	1.63	1.63	3.25	4.63	3.25	6.50	7.88	10.00	9.13	9.75	9.37	9.37	9.75	9.63
12	2.38	1.75	1.38	3.12	5.50	3.00	6.13	8.50	11.63	9.00	10.00	11.00	11.13	10.88	10.63
13	1.38	1.87	1.63	3.50	4.88	2.38	5.88	7.25	9.50	11.00	10.13	9.13	9.25	9.50	8.88
14	3.88	2.00	1.13	3.12	7.00	2.88	6.00	9.88	12.13	9.25	9.25	11.75	11.88	11.38	11.88
15	1.25	1.87	1.25	3.12	4.37	2.50	5.62	6.87	9.25	11.88	12.00	9.37	9.25	9.37	9.00
16	1.38	1.75	1.50	3.25	4.63	3.38	6.63	8.00	10.38	8.88	8.88	9.00	8.88	9.13	10.00
17	2.00	1.75	5.50	7.25	9.25	3.00	10.25	12.25	15.75	9.25	10.38	11.00	11.00	15.00	14.63
18	1.75	1.87	1.50	3.38	5.13	3.12	6.50	8.25	12.38	13.63	14.25	14.00	14.13	10.13	10.25
19	3.63	1.75	1.50	3.25	6.87	2.75	6.00	9.63	12.25	11.75	10.25	12.13	12.00	12.00	11.63
20	0.75	2.25	1.00	3.25	4.00	2.50	5.75	6.50	9.00	12.25	12.13	9.25	9.75	9.25	9.00

	1.56	1.81	1.50	3.25	5.00	2.94	6.06	8.12	11.00	10.13	10.19	10.19	10.38	9.94	10.13	MEDIAN
	1.98	1.85	1.80	3.65	5.62	2.88	6.53	8.50	11.23	10.60	10.70	10.60	10.66	10.64	10.55	MEAN
21	1.50	1.87	0.87	2.75	4.25	2.63	5.38	6.87	8.50	9.25	8.38	9.13	8.75	8.63	8.75	
22	1.13	1.87	1.13	3.00	4.13	3.25	6.25	7.38	9.50	8.38	8.88	8.50	8.50	8.75	9.37	
23	0.75	2.00	2.13	4.13	4.88	3.88	8.00	8.75	11.50	8.38	9.00	8.63	8.75	9.75	10.38	
24	0.75	1.87	1.63	3.50	4.25	2.63	6.13	6.87	11.63	8.88	10.88	10.88	10.75	10.25	9.00	
25	8.75	2.13	1.13	3.25	12.00	2.88	6.13	14.88	9.75	18.63	8.75	16.75	17.00	16.50	16.75	
26	2.13	2.00	1.25	3.25	5.38	2.50	5.75	7.88	9.13	10.13	16.50	9.88	9.75	9.88	9.50	
27	1.63	2.13	1.25	3.38	5.00	2.75	6.13	7.75	9.25	9.37	9.63	9.13	9.25	9.25	9.50	
28	1.13	1.87	1.00	2.88	4.00	3.12	6.00	7.13	9.50	9.63	10.50	10.00	9.75	9.50	9.88	
29	2.00	4.75	1.13	5.88	7.88	2.63	8.50	10.50	13.38	8.50	9.00	9.88	12.75	12.88	12.38	
30	1.63	1.63	1.25	2.88	4.50	2.38	5.25	6.87	8.63	13.50	12.38	12.00	8.88	9.00	8.75	
	1.56	1.94	1.19	3.25	4.69	2.69	6.13	7.56	9.50	9.31	9.31	9.88	9.50	9.63	9.50	MEDIAN
	2.14	2.21	1.27	3.49	5.62	2.86	6.35	8.49	10.07	10.46	10.39	10.48	10.41	10.44	10.43	MEAN
	1.50	1.87	1.25	3.25	4.88	2.81	6.13	8.00	10.00	9.88	10.06	9.88	9.75	9.75	10.00	TOTAL MEDIAN
	1.95	1.99	1.49	3.48	5.44	3.26	6.75	8.62	11.25	10.77	10.68	10.74	10.72	10.73	10.61	TOTAL MEAN

ANALYSIS OF DATA (FILE 16)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O	
1	0.00	1.87	1.38	3.25	0.00	2.75	6.00	0.00	9.37	9.75	0.00	9.75	9.75	9.63	9.75	
2	1.63	1.87	1.25	3.12	4.75	2.88	6.00	7.63	9.37	10.13	10.00	10.38	10.38	10.38	10.00	
3	2.00	1.87	1.25	3.12	5.13	2.50	5.62	7.63	9.25	9.88	9.50	9.63	10.00	9.75	9.88	
4	2.13	2.25	1.00	3.25	5.38	2.63	5.88	8.00	9.25	9.63	9.88	13.13	12.75	12.88	13.00	
5	5.38	1.87	1.13	3.00	8.38	2.75	5.75	11.13	12.63	13.25	13.00	10.75	10.00	10.00	9.88	
6	3.12	1.13	1.13	2.25	5.38	2.63	4.88	8.00	9.25	10.13	9.75	9.63	10.13	10.00	10.00	
7	3.00	1.63	1.00	2.63	5.62	2.63	5.25	8.25	9.13	10.13	10.25	11.13	11.50	11.75	11.63	
8	3.88	2.00	1.25	3.25	7.13	2.50	5.75	9.63	10.63	10.75	11.63	9.88	9.88	9.50	11.00	
9	2.13	2.00	0.87	2.88	5.00	4.00	6.87	9.00	10.88	10.50	10.88	12.63	14.25	14.25	12.88	
10	3.88	3.63	0.87	4.50	8.38	2.63	7.13	11.00	13.25							
	3.00	1.87	1.13	3.12	5.38	2.63	5.81	8.25	9.37	10.13	10.13	10.38	10.13	10.00	10.00	MEDIAN
	3.01	2.01	1.11	3.12	6.13	2.79	5.91	8.92	10.30	10.46	10.61	10.76	10.96	10.90	10.89	MEAN
11	2.38	1.87	0.87	2.75	5.13	2.75	5.50	7.88	9.00	13.88	12.75	11.25	9.50	9.50	9.63	
12	1.75	2.00	0.75	2.75	4.50	2.38	5.13	6.87	8.50	9.50	10.00	9.37	9.50	9.37	9.00	
13	2.75	1.87	0.87	2.75	5.50	2.75	5.50	8.25	9.00	9.50	8.63	9.63	9.50	9.63	10.00	
14	2.25	1.87	1.00	2.88	5.13	2.50	5.38	7.63	8.88	9.75	10.25	9.75	9.75	9.88	9.63	
15	2.75	1.87	0.87	2.75	5.50	2.63	5.38	8.12	9.00	9.88	9.50	10.00	10.00	9.88	10.00	
16	2.38	5.50	1.13	6.63	9.00	2.63	9.25	11.63	12.88	10.00	10.38	10.00	13.63	13.88	13.88	
17	3.50	2.75	1.25	4.00	7.50	3.25	7.25	10.75	13.63	12.63	14.25	15.38	12.63	12.75	13.38	
18	2.13	1.63	0.87	2.50	4.63	3.00	5.50	7.63	9.00	14.13	12.63	11.25	10.13	9.75	9.50	
19	2.50	1.75	1.00	2.75	5.25	2.38	5.13	7.63	8.63	9.75	9.37	9.75	9.88	10.00	9.37	
20	2.88	2.00	1.13	3.12	6.00	2.50	5.62	8.50	8.88	9.88	9.25	9.13	9.88	10.00	10.13	

	2.44	1.87	0.94	2.75	5.38	2.63	5.50	8.00	9.00	9.88	10.13	9.88	9.88	9.88	9.81	MEDIAN
	2.53	2.31	0.98	3.29	5.81	2.67	5.96	8.49	9.74	10.89	10.70	10.60	10.44	10.46	10.45	MEAN
21	2.00	1.75	0.75	2.50	4.50	2.63	5.13	7.13	8.50	9.75	10.75	9.88	9.63	9.25	9.37	
22	3.00	1.87	1.13	3.00	6.00	2.38	5.38	8.38	8.88	9.88	9.00	10.00	10.13	10.50	10.25	
23	3.12	1.87	1.00	2.88	6.00	2.63	5.50	8.63	8.88	10.25	10.00	10.13	10.13	10.00	10.25	
24	1.87	1.75	1.00	2.75	4.63	2.63	5.38	7.25	8.75	9.13	10.38	9.13	9.00	9.00	9.00	
25	1.38	1.87	0.87	2.75	4.13	2.63	5.38	6.75	8.63	9.25	9.63	9.13	9.25	9.13	9.13	
26	2.13	1.75	1.50	3.25	5.38	2.75	6.00	8.12	9.13	10.00	9.13	9.88	9.75	10.38	10.50	
27	2.13	1.63	1.25	2.88	5.00	2.50	5.38	7.50	8.63.	9.75	9.88	9.88	9.75	9.50	9.25	
28	2.25	2.25	1.25	3.50	5.75	2.50	6.00	8.25	9.13	9.50	9.25	9.37	10.00	10.00	10.00	
29	5.13	2.00	1.00	3.00	8.12	2.38	5.38	10.50	11.38	10.00	10.00	12.88	12.63	12.38	12.25	
30	1.75	1.63	2.25	3.88	5.62	3.12	7.00	8.75	10.38	11.88	12.63	9.25	8.88	10.13	10.88	
	2.13	1.81	1.06	2.94	5.50	2.63	5.38	8.19	8.88	9.81	9.94	9.88	9.75	10.00	10.13	MEDIAN
	2.47	1.84	1.20	3.04	5.51	2.61	5.65	8.12	9.23	9.94	10.06	9.95	9.91	10.02	10.09	MEAN
	2.38	1.87	1.00	2.94	5.38	2.63	5.50	8.12	9.13	9.88	10.00	9.88	10.00	10.00	10.00	TOTAL MEDIAN
	2.66	2.05	1.10	3.15	5.81	2.69	5.84	8.50	9.75	10.43	10.45	10.43	10.42	10.45	10.46	TOTAL MEAN

Appendix F DATA FILES (Cont.)

RD #	COL A	COL B	COL C	COL D	COL E	COL F	COL G	COL H	COL I	COL J	COL K	COL L	COL M	COL N	COL O	
1	0.00	1.87	1.87	3.75	4.00	3.25	7.00	8.00	11.50							
2	2.00	2.63	1.50	4.13	6.13	2.75	6.87	8.38	10.50	11.88	0.00	11.00	11.75	11.38	10.88	
3	1.75	2.25	2.50	4.75	6.50	3.38	8.12	9.88	12.25	10.13	10.88	10.63	10.25	11.25	11.88	
4	1.75	2.13	1.25	3.38	5.13	2.88	6.25	8.00	10.75	11.38	11.75	11.75	11.63	10.38	9.88	
5	3.00	2.50	1.63	4.13	7.13	2.88	7.00	10.00	13.75	11.25	12.25	13.50	13.88	14.25	14.25	
6	1.13	2.00	1.13	3.12	4.25	79.00	82.13	83.25	85.75	13.63	12.38	10.50	10.00	9.50	85.63	
7	1.50	1.75	1.50	3.25	4.75	3.00	6.25	7.75	86.88	10.13	86.75	87.13	86.88	87.25	11.25	
8	1.00	2.00	1.63	3.63	4.63	3.38	7.00	8.00	20.00	76.88	9.75	9.25	9.50	9.63	10.00	
9	1.25	1.75	1.63	3.38	4.63	3.00	6.38	7.63	20.13	9.63	10.13	10.38	10.13	10.13	9.75	
10	1.50	1.63	1.38	3.00	4.50	6.13	9.13	10.63	23.63	9.37	9.88	10.13	10.00	9.75	12.88	
	1.50	2.00	1.56	3.50	4.75	3.12	7.00	8.88	16.88	11.25	11.31	10.63	10.25	10.38	11.25	MEDIAN
	1.65	2.05	1.60	3.65	5.29	10.96	14.61	17.11	29.51	18.25	20.47	19.36	19.33	19.28	19.60	MEAN
11	2.75	1.87	8.25	10.13	12.88	2.88	13.00	15.75	30.88	10.88	13.00	14.25	14.50	21.38	18.13	
12	1.87	1.63	4.75	6.38	8.25	4.13	10.50	12.38	35.25	10.13	17.88	17.00	16.75	13.25	14.50	
13	3.88	2.00	1.63	3.63	7.50	4.13	7.75	11.63	28.50	21.00	15.00	17.00	17.38	14.25	14.25	
14	1.63	1.75	1.38	3.12	4.75	3.00	6.13	7.75	23.88	14.50	13.75	11.50	11.25	11.00	9.88	
15	0.75	1.63	1.87	3.50	4.25	3.00	6.50	7.25	20.13	13.88	10.63	9.75	9.63	10.13	10.13	
16	1.87	1.75	1.13	2.88	4.75	2.88	5.75	7.63	19.00	10.50	9.00	10.13	10.25	9.50	9.37	
17	2.25	1.75	3.38	5.13	7.38	4.13	9.25	11.50	22.88	9.63	9.63	10.00	10.00	12.25	13.50	
18	1.38	1.75	1.38	3.13	4.50	71.13	74.25	75.63	92.00	10.13	15.13	14.25	14.25	12.25	79.25	
19	1.13	1.50	1.13	2.63	3.75	3.63	6.25	7.38	9.00	92.13	77.38	77.13	76.88	76.63	9.13	
20	1.13	1.63	1.13	2.75	3.88	3.38	6.13	7.25	10.00	8.50	9.63	9.63	9.75	9.75	9.50	

	1.75	1.75	1.50	3.31	4.75	3.50	7.13	9.63	13.38	10.69	11.38	12.88	12.75	12.25	11.81	MEDIAN
	1.86	1.73	2.60	4.32	6.19	10.23	14.55	16.41	29.15	20.13	19.13	19.06	19.06	19.04	18.76	MEAN
21	1.13	1.50	1.50	3.00	4.13	3.50	6.50	7.63	9.63	9.88	9.13	9.13	9.00	9.37	9.50	
22	1.38	2.00	0.87	2.88	4.25	3.38	6.25	7.63	10.00	9.00	9.37	9.63	10.13	9.50	9.37	
23	1.50	3.63	1.50	5.13	6.63	3.63	8.75	10.25	12.13	10.00	9.50	9.63	11.25	11.88	12.13	
24	1.63	2.50	1.13	3.63	5.25	3.12	6.75	8.38	10.63	11.88	12.25	12.38	11.25	10.88	10.38	
25	1.87	1.75	1.13	2.88	4.75	2.88	5.75	7.63	9.25	10.88	10.25	10.50	9.75	9.75	9.50	
26	1.87	1.75	1.25	3.00	4.88	3.00	6.00	7.88	9.37	9.63	9.50	9.50	9.50	9.63	9.75	
27	1.75	1.63	1.25	2.88	4.63	4.00	6.87	8.63	10.13	9.75	9.75	9.63	9.50	9.50	10.50	
28	1.50	1.63	1.38	3.00	4.50	3.00	6.00	7.50	10.63	9.37	11.00	10.75	10.75	10.88	9.88	
29	1.75	2.38	1.00	3.38	5.13	2.88	6.25	8.00	9.88	10.75	9.50	9.75	10.50	10.13	10.00	
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1.63	1.75	1.25	3.00	4.75	3.12	6.25	7.88	10.00	9.88	9.50	9.63	10.13	9.75	9.88	MEDIAN
	1.60	2.08	1.22	3.31	4.90	3.26	6.57	8.17	10.18	10.13	10.03	10.10	10.18	10.17	10.11	MEAN
	1.63	1.75	1.38	3.38	4.75	3.25	6.75	8.00	12.25	10.31	10.63	10.50	10.38	10.63	10.25	TOTAL MEDIAN
	1.71	1.95	1.83	3.78	5.49	8.32	12.09	13.99	23.39	16.31	16.48	16.28	16.29	16.26	16.25	TOTAL MEAN

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